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Epitome

(57) [Abstract]
[Technical problem] A high-pressure condition is canceled without spoiling the amenity, when the pressure of the refrigerant which the compressor breathed out during heating operation exceeds a predetermined value.
[Means for Solution] When a pressure sensor 1 needs to detect more than a predetermined pressure and needs to choose the control system of the refrigerant control valve 55, the pressure which a pressure sensor 1 detects -- high pressure PH Memorize and the opening of the refrigerant control valve 55 of the machine in all rooms under operation is extracted to current one half. ****** -- a time check -- if time amount T1 is over predetermined time -- step S6 -- moving -- otherwise, the step S5 -- moving -- high pressure PH the time of the difference with the current pressure P being over 0.1MPa(s) -- step S6 -- shifting -- otherwise, -- coming -- being alike -- it returns to step S4. A pressure P is high pressure PH. When low, control of the method which moves to step S7 and closes the opening of the refrigerant control valve 55 is chosen, and a pressure P is high pressure PH. When high, control of the method which moves to step S8 and opens the opening of the refrigerant control valve 55 is chosen.

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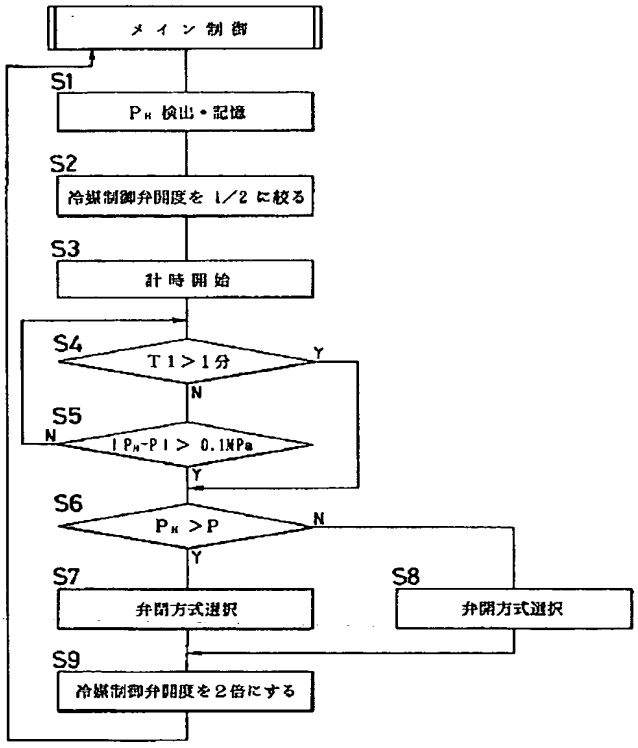

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CLAIMS

[Claim(s)]
[Claim 1] The air conditioner which makes piping connection and constitutes the compressor, the outdoor heat exchanger, indoor heat exchanger, etc. characterized by providing the following A pressure detection means to detect the refrigerant pressure of a compressor discharge side The judgment control means which judges that it is more effective in the high-pressure dissolution of said compressor discharge side that it is more effective in the high-pressure dissolution of said compressor discharge side whether to control in the direction which opens the refrigerant control valve which controls the amount of the refrigerant supplied to said indoor heat exchanger when this pressure detection means detects predetermined high pressure at the time of heating operation, and whether to control in the direction which closes said refrigerant control valve
[Claim 2] The air conditioner according to claim 1 which the judgment control means equips with the function to substitute for the last judgment when the last time same indoor heat exchanger as the time of a judgment is operated and a pressure detection means detects predetermined high pressure, while two or more installation of the indoor heat exchanger is carried out.
[Claim 3] When it has a temperature detection means to detect the temperature of the refrigerant which flows out of indoor heat exchanger at the time of heating operation and a pressure detection means detects predetermined high pressure at the time of heating operation, While computing whenever [supercooling] based on the data which said temperature detection means and said pressure detection means detect The air conditioner according to claim 1 or 2 which the judgment control means equips with the function to change the opening of said refrigerant control valve in the direction judged that is effective in a high-pressure dissolution based on whenever [this supercooling].

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] By repeating compression/expansion of a refrigerant, this invention constitutes a refrigerating cycle and relates to the air conditioner which performs the cold/heating.
[0002]
[Description of the Prior Art] In the case of the so-called multi-type of air conditioner which

connects two or more sets of interior units to one set of an exterior unit, depending on the number of driver's stands of an interior unit, the difference of the capacity of an exterior unit and the operation capacity of an interior unit may widen greatly.

[0003] Moreover, like 1:20 has the capacity factor of an interior unit and an exterior unit now when the capacity of the interior unit in every set is in the inclination of the formation of small capacity. For this reason, the pressure of a compressor discharge side is the situation which is easy to lapse into the so-called heavy load condition of going up unusually at the time of heating operation which supplies directly the refrigerant compressed with the compressor to an interior unit.

[0004] If operation of a heavy load condition continues, since the blowdown temperature in an interior unit will rise and the amenity will be spoiled, increase the opening of the refrigerant control valve which controls the amount of the refrigerant which flows into an interior unit, the amount of condensation is made to increase, and the dissolution of a heavy load condition is aimed at.

[0005]

[Problem(s) to be Solved by the Invention] However, although the above-mentioned approach is [that the capacity of the indoor heat exchanger which functions as a condenser is smaller than the capacity of the outdoor heat exchanger which functions as an evaporator, and] effective in 100% or less of about 75% or more of cases, and the dissolution of a heavy load itself can be attained when the capacity of indoor heat exchanger is larger than the capacity of an outdoor heat exchanger, since the heating value emitted from an interior unit increases, it is not a good approach practical. That is, by opening a refrigerant control valve, the blowdown temperature of an interior unit rises, since the amenity is spoiled, there is a trouble referred to as not desirable, and solution of this point had become a technical problem.

[0006]

[Means for Solving the Problem] It sets to the air conditioner which makes piping connection and constitutes above compressor, outdoor heat exchanger, indoor heat exchangers, etc., and this invention is [0007]. When a pressure detection means to detect the refrigerant pressure of a compressor discharge side, and this pressure detection means detect predetermined high pressure at the time of heating operation, [that it is more effective in the high-pressure dissolution of said compressor discharge side whether to control in the direction which opens the refrigerant control valve which controls the amount of the refrigerant supplied to said indoor heat exchanger, and] The air conditioner of the 1st configuration of having had the judgment control means which judges that it is more effective in the high-pressure dissolution of said compressor discharge side whether to control in the direction which closes said refrigerant control valve, and [0008] The air conditioner of the 2nd configuration of that the judgment control means was equipped with the function to substitute for the last judgment when the last time same indoor heat exchanger as the time of a judgment was operated and a pressure detection means detected predetermined high pressure in the air conditioner of said 1st configuration, while installing two or more indoor heat exchangers, and [0009] When it has a temperature detection means to detect the temperature of the refrigerant which flows out of indoor heat exchanger at the time of heating operation in the air conditioner of said the 1st or 2nd configuration and a pressure detection means detects predetermined high pressure at the time of heating operation, While computing whenever [supercooling] based on the data which said temperature detection means and said pressure detection means detect It enables it to solve the above-mentioned technical problem based on whenever [this supercooling] by [which the judgment control means equipped with the function to change the opening of said refrigerant control valve in the direction judged that is effective in a high-pressure dissolution] offering the air conditioner of the 3rd configuration.

[0010]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained based on a drawing. Drawing 4 is drawing showing the configuration of an engine drive heat pump air conditioner, for a receiver tank and 55, as for indoor heat exchanger and 57, a refrigerant control valve and 56 are [a four way valve and 53 / an outdoor heat exchanger and 54 / an accumulator

and 58] expansion valves, especially these devices are not conventionally different from a well-known thing, and the compressor which drives 51 with the engine which is not illustrated, and 52 form the heating circuit which carried out sequential connection and which was shown with the broken line, and the air conditioning circuit shown as the continuous line.

[0011] Moreover, the pressure sensor 1 which detects the pressure of the refrigerant which the compressor 51 breathed out, the temperature sensor 2 which detects the temperature of the refrigerant which flows out of indoor heat exchanger 56 at the time of heating operation, and a controller 3 are installed. In addition, 59 is an outdoor blower, 60 is an indoor blower, and since this indoor blower 60, and above mentioned refrigerant control valve 55 and indoor heat exchanger 56 are installed in the interior of a room which air-conditions, they are doubled and are called the interior unit.

[0012] Input interface 3A which carries out signal transformation of the information which pressure-sensor 1 and a temperature sensor 2 output, and is outputted to arithmetic-and-program-control (it is called Following CPU) 3B as a controller 3 as shown, for example in drawing 5 , Storage (it is called Following ROM) 3C which has memorized predetermined operation expression, an operation program, etc., Output interface 3D which inputs the signal from CPU3B and outputs a necessary signal to the refrigerant control valve 55 etc., Clock circuit 3E equipped with the timer ability which outputs a signal for every predetermined time and can clock a duration, The thing equipped with storage (it is called Following RAM) 3F which memorize the information inputted from pressure-sensor 1 and a temperature sensor 2, the time amount clocked by clock circuit 3E and in which reading/elimination is possible is used.

[0013] And ROM3C is made to memorize the control program shown in drawing 1 - drawing 3 in order to control the opening of the refrigerant control valve 55 based on the pressure of the refrigerant circuit inputted from pressure-sensor 1 and a temperature sensor 2, and the information on temperature.

[0014] First, based on drawing 1 and drawing 2 , the point which chooses a heavy load dissolution method is explained. It is high pressure PH about the refrigerant discharge pressure which is performing the usual operation control based on an air-conditioning load by the Maine control, a pressure sensor 1 detects a predetermined more than pressure, for example, 2.3 MPas, starts the flows of control of drawing 1 when it is judged that it is necessary to choose a heavy load dissolution method, and a pressure sensor 1 detects at step S1. It carries out and memorizes to RAM3F.

[0015] At step S2, the opening of the refrigerant control valve 55 of the machine in all rooms currently operated is extracted to one half of current opening.

[0016] the time check by the timer ability which started the timer ability of clock circuit 3E at step S3, started the time check and was started at step S3 in step S4 -- if it judges and is over whether time amount T1 is over predetermined time, for example, 1 minute, it will shift to step S6, otherwise, will shift to step S5.

[0017] High pressure PH memorized to RAM3F at step S5 The pressure P of the refrigerant in which the pressure sensor 1 is carrying out current detection is measured, when the differential pressure is over 0.1MPa(s), it shifts to step S6, and when that is not right, it returns to step S4.

[0018] At step S6, it is high pressure PH. High pressure PH which measures a pressure P and the current pressure P has memorized to RAM3F Control of the method which shifts to step S7 and closes the opening of the refrigerant control valve 55 when low is chosen. High pressure PH which the direction of the current pressure P has memorized to RAM3F When high, control of the method which shifts to step S8 and opens the opening of the refrigerant control valve 55 is chosen.

[0019] And in step S9, opening of the refrigerant control valve 55 of the machine in all rooms currently operated is made into twice current opening, and is returned, and it returns to the Maine control.

[0020] Moreover, when the usual operation control based on an air-conditioning load is performed by the Maine control and a pressure sensor 1 detects a predetermined more than pressure, for example, 2.3 MPas, Start the flows of control of drawing 2 and the interior unit currently operated at step S21 is investigated. [that it is more effective whether to control in

the direction which opens the opening of the refrigerant control valve 55 to the high-pressure dissolution of compressor 51 discharge side, and] When the completely same interior unit as the time of judging last time is operated [that whether to control in the closed direction is more effective, and], it shifts to step S22 and the same valve-control method as last time is chosen. To the Maine control Return, When that is not right, it shifts to step S23, and it determines to choose newly the method which controls the refrigerant control valve 55, and returns to the Maine control (when it returns to the Maine control via step S23, control of drawing 1 continuously described above is performed).

[0021] Next, based on drawing 3 , the concrete example of control of the refrigerant control valve 55 performed for a high-pressure dissolution is explained. When the usual operation control based on an air-conditioning load is performed by the Maine control, the pressure sensor 1 detected the predetermined more than pressure, for example, 2.3 MPas, and a high-pressure dissolution is needed, it is started automatically and the flows of control of drawing 3 choose the approach of a heavy load dissolution at step S41. In this case, it performs in order of drawing 2 and drawing 1 .

[0022] In step S41, when the method which opens the opening of the refrigerant control valve 55 is chosen, opening of the refrigerant control valve 55 of the machine in all rooms which shifts to step S42 and is operated is made full open, and it returns to the Maine control after that. On the other hand, when the method which closes the opening of the refrigerant control valve 55 in step S41 is chosen, the pressure of the refrigerant which shifts to step S43 and a pressure sensor 1 detects is memorized to RAM3F.

[0023] At step S44, the saturation temperature of the refrigerant which the compressor 51 is breathing out is calculated by the operation expression memorized to the pressure memorized to RAM3F, and ROM3C.

[0024] At step S45, all the temperature of the refrigerant which the temperature sensor 2 of the machine in all rooms currently operated detects is memorized to RAM3F.

[0025] At step S46, whenever [supercooling / of each interior unit] (SCi) is made into the refrigerant outlet temperature (temperature which a temperature sensor 2 detects) of SCi= saturation-temperature-each interior unit, and is calculated, and it memorizes to RAM3F.

[0026] At step S47, it memorizes to RAM3F by making whenever [supercooling / of each interior unit] (SCi) into SCi=SCi +1.

[0027] the time check by the timer ability which started the timer ability of clock circuit 3E at step S48, started the time check and was started at step S48 in step S49 -- time amount T2 waits to judge and exceed whether it is over predetermined time, for example, 10 seconds, and shifts to step S50.

[0028] At step S50, like step S43 - step S46, whenever [supercooling / of each interior unit] (SCi') is made into the refrigerant outlet temperature of SCi'= saturation-temperature-each interior unit, and is calculated, and it memorizes to RAM3F.

[0029] At step S51, whenever [supercooling / which was searched for at step S47], and (SCi), whenever [supercooling / which was searched for at step S50] (SCi') When a sequential comparison is carried out over the machine in all rooms currently operated and SCi-SCi' is over 0, it shifts to step S52. The opening of the refrigerant control valve 55 is reduced by one from current. To step S50 Return, When SCi-SCi' is less than zero, it shifts to step S53, and the opening of the refrigerant control valve 55 is increased one from the present, and return and SCi-SCi' return to step S50 at the Maine control at the time of 0 (crossing to all interior units).

[0030] As described above, it sets to the air conditioner of this invention. By extracting the opening of the refrigerant control valve 55 of the interior unit currently operated, and investigating the pressure variation, when a pressure sensor 1 detects a high predetermined pressure Since it judges that it is more effective one with more effective opening the refrigerant control valve 55 in a high-pressure (heavy load condition) dissolution and whether to close and the opening of the refrigerant control valve 55 of an interior unit is controlled based on this judgment Even if it reduces the amount of the refrigerant which saves up and circulates through a refrigerant to the interior unit currently operated, while the interior unit with sufficient big capacity to which heating (condensation) capacity does not fall is operating, the opening of the

refrigerant control valve 55 is extracted and the dissolution of a heavy load condition is aimed at, and it is [0031]. On the contrary, the capacity of the interior unit currently operated is small, and in having extracted the opening of the refrigerant control valve 55 and having saved up the refrigerant to the interior unit, when heating (condensation) capacity declines and a pressure rises further, the optimal heavy load dissolution approach can be chosen for every combination of the interior unit currently operated, such as opening the opening of the refrigerant control valve 55 and aiming at the dissolution of a heavy load condition.

[0032] In addition, since this invention is not limited to the gestalt of the above-mentioned implementation, in accordance with the meaning of a publication, various kinds of deformation implementation is possible for it to a claim.

[0033] For example, actuation of step S2 in drawing 1 can also be constituted so that it may choose from interior units with a large capacity, for example, may carry out only about the proper number, such as one third of the number, or the number of half.

[0034] Moreover, actuation of step S2 in drawing 1 constitutes the opening of the refrigerant control valve 55 so that it may increase 20%, for example, and you may make it investigate subsequent pressure variation. In this case, the greater than sign of the judgment type in step S6 is made into the reverse sense, and is judged.

[0035]

[Effect of the Invention] As described above, it sets to the air conditioner of this invention. When a pressure detection means detects predetermined high pressure, the refrigerant control valve of the interior unit currently operated for example, by extracting to one half of opening and investigating the pressure variation Since it judges that it is more effective one with more effective opening a refrigerant control valve in the dissolution of a heavy load condition and whether to close and the opening of the refrigerant control valve of an interior unit is controlled based on this judgment Even if it reduces the amount of the refrigerant which saves up and circulates through a refrigerant to the interior unit currently operated, while the interior unit with sufficient big capacity to which heating (condensation) capacity does not fall is operating, the opening of a refrigerant control valve is extracted and the dissolution of a heavy load condition is aimed at, and it is [0036]. On the contrary, the capacity of the interior unit currently operated is small, and in having extracted the opening of a refrigerant control valve and having saved up the refrigerant to the interior unit, when heating (condensation) capacity declines and a refrigerant pressure rises further, the optimal heavy load dissolution approach can be chosen for every combination of the interior unit currently operated, such as opening the opening of a refrigerant control valve and aiming at the dissolution of a heavy load condition.

[0037] Moreover, when the completely same interior unit as the time of judging last time is operated [that it is more effective that it is more effective whether to control in the direction which opens the opening of a refrigerant control valve to the dissolution of a heavy load condition, and whether to control in the closed direction, and], in the air conditioner constituted so that the same valve-control method as last time might be chosen, a heavy load condition can be canceled promptly.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the explanatory view showing the selection point of a heavy load dissolution method.
[Drawing 2] It is the explanatory view showing the selection point of a heavy load dissolution method.
[Drawing 3] It is the explanatory view showing the heavy load dissolution point.
[Drawing 4] It is the explanatory view showing the whole equipment configuration.
[Drawing 5] It is the explanatory view showing the configuration of a controller.
[Description of Notations]
1 Pressure Sensor
2 Temperature Sensor
3 Controller
3A Input interface
3B Arithmetic and program control (CPU)
3C Storage (ROM)
3D Output interface
3E Clock circuit
3F Storage (RAM)
51 Compressor
52 Four Way Valve
53 Outdoor Heat Exchanger
54 Receiver Tank
55 Refrigerant Control Valve
56 Indoor Heat Exchanger
57 Accumulator
58 Expansion Valve
59 Outdoor Blower
60 Indoor Blower

[Translation done.]

DRAWINGS

[Drawing 1]

(19)日本国特許庁（ＪＰ）　(12) 公開特許公報（A）　(11)特許出願公開番号

特開平9－184662

(43)公開日　平成９年(1997)７月15日

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審査請求　未請求　請求項の数３　ＦＤ　（全　７　頁）

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(22)出願日　平成７年(1995)12月29日

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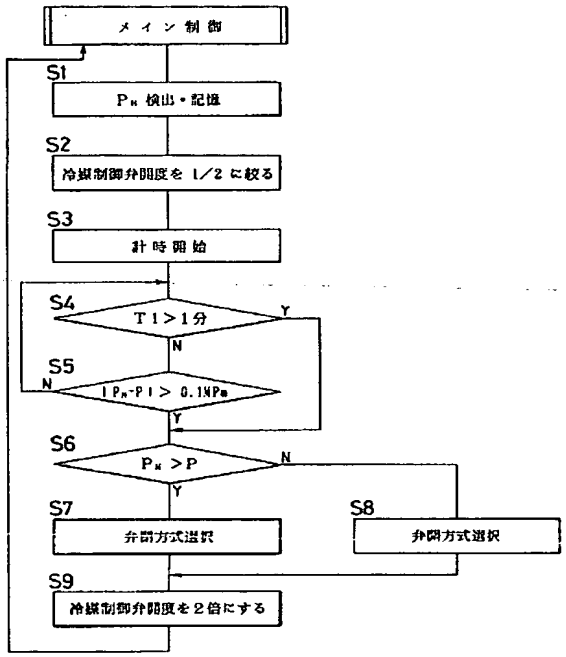
(54)【発明の名称】　空気調和機

(57)【要約】

【課題】　暖房運転中に圧縮機が吐出した冷媒の圧力が所定値を越えた時、快適性を損ねることなく、高圧状態を解消する。

【解決手段】　圧力センサ１が所定の圧力以上を検出し、冷媒制御弁５５の制御方式を選択する必要がある時には、圧力センサ１が検出する圧力を高圧P_Hとして記憶し、運転中の全室内機の冷媒制御弁５５の開度を現在の１／２に絞り、計時時間Ｔ１が所定時間を越えていればステップＳ６に移り、そうでなければステップＳ５に移り、高圧P_Hと現在の圧力Ｐとの差が０．１ＭＰａを越えているときにはステップＳ６に移行し、そうでないときにはステップＳ４に戻る。圧力Ｐが高圧P_Hより低い時にはステップＳ７に移って冷媒制御弁５５の開度を閉じる方式の制御を選択し、圧力Ｐが高圧P_Hより高い時にはステップＳ８に移って冷媒制御弁５５の開度を開く方式の制御を選択する。



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【特許請求の範囲】

【請求項１】　圧縮機・室外熱交換器・室内熱交換器などを配管接続して構成する空気調和機において、圧縮機吐出側の冷媒圧力を検出する圧力検出手段と、この圧力検出手段が暖房運転時に所定の高圧を検出したとき、前記室内熱交換器に供給する冷媒の量を制御する冷媒制御弁を開く方向に制御した方が前記圧縮機吐出側の高圧解消に有効か、前記冷媒制御弁を閉じる方向に制御した方が前記圧縮機吐出側の高圧解消に有効かを判定する判定制御手段と、を備えたことを特徴とする空気調和機。

【請求項２】　室内熱交換器が複数設置されると共に、前回判定時と同じ室内熱交換器が運転されていて圧力検出手段が所定の高圧を検出したとき、前回の判定を代用する機能を判定制御手段が備えている請求項１記載の空気調和機。

【請求項３】　暖房運転時に室内熱交換器から流出する冷媒の温度を検出する温度検出手段を備え、圧力検出手段が暖房運転時に所定の高圧を検出したとき、前記温度検出手段および前記圧力検出手段が検出するデータに基づいて過冷却度を算出すると共に、この過冷却度に基づいて前記冷媒制御弁の開度を高圧解消に有効であると判定された方向へ変更する機能を判定制御手段が備えている請求項１または２記載の空気調和機。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、冷媒の圧縮／膨張を繰り返すことによって冷凍サイクルを構成し、冷／暖房などを行う空気調和機に関するものである。

【０００２】

【従来の技術】１台の室外機に複数台の室内機を接続する、いわゆるマルチタイプの空気調和機の場合、室内機の運転台数によっては、室外機の容量と室内機の運転容量との差が大きく開くことがある。

【０００３】また、１台毎の室内機の容量が小容量化の傾向にある現在では、室内機と室外機との容量比が１：２０のようなこともある。このため、圧縮機で圧縮した冷媒を室内機に直接供給する暖房運転時に、圧縮機吐出側の圧力が異常に上昇する、いわゆる高負荷状態に陥り易い状況になっている。

【０００４】高負荷状態の運転が続くと、室内機における吹き出し温度が上昇し、快適性が損なわれるので、室内機に流入する冷媒の量を制御する冷媒制御弁の開度を増加して、凝縮量を増加させ高負荷状態の解消を図っている。

【０００５】

【発明が解決しようとする課題】しかし、上記の方法は、凝縮器として機能する室内熱交換器の容量が、蒸発器として機能する室外熱交換器の容量より小さい、例えば１００％以下７５％程度以上の場合には有効であるが、室内熱交換器の容量が室外熱交換器の容量より大きい場合には、高負荷の解消自体は達成できるものの、室内機から放出する熱量が増加するので実用的には良い方法ではない。すなわち、冷媒制御弁を開けることにより、室内機の吹き出し温度が上昇し、快適性を損ねるので好ましくないと云った問題点があり、この点の解決が課題となっていた。

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【０００６】

【課題を解決するための手段】この発明は、上記のような、圧縮機・室外熱交換器・室内熱交換器などを配管接続して構成する空気調和機において

【０００７】圧縮機吐出側の冷媒圧力を検出する圧力検出手段と、この圧力検出手段が暖房運転時に所定の高圧を検出したとき、前記室内熱交換器に供給する冷媒の量を制御する冷媒制御弁を開く方向に制御した方が前記圧縮機吐出側の高圧解消に有効か、前記冷媒制御弁を閉じる方向に制御した方が前記圧縮機吐出側の高圧解消に有効かを判定する判定制御手段と、を備えるようにした第１の構成の空気調和機と、

【０００８】前記第１の構成の空気調和機において、室内熱交換器を複数設置すると共に、前回判定時と同じ室内熱交換器が運転されていて圧力検出手段が所定の高圧を検出したとき、前回の判定を代用する機能を判定制御手段が備えるようにした第２の構成の空気調和機と、

【０００９】前記第１または第２の構成の空気調和機において、暖房運転時に室内熱交換器から流出する冷媒の温度を検出する温度検出手段を備え、圧力検出手段が暖房運転時に所定の高圧を検出したとき、前記温度検出手段および前記圧力検出手段が検出するデータに基づいて過冷却度を算出すると共に、この過冷却度に基づいて前記冷媒制御弁の開度を高圧解消に有効であると判定された方向へ変更する機能を判定制御手段が備えるようにした第３の構成の空気調和機と、を提供することにより、上記の課題を解決し得るようにしたものである。

【００１０】

【発明の実施の形態】以下、図面に基づいて本発明の一実施形態を説明する。図４は、エンジン駆動ヒートポンプ空調装置の構成を示す図であり、５１は図示しないエンジンなどによって駆動される圧縮機、５２は四方弁、５３は室外熱交換器、５４はレシーバタンク、５５は冷媒制御弁、５６は室内熱交換器、５７はアキュームレータ、５８は膨張弁であり、これら機器は従来周知のものと特に変わるものではなく、順次連結して破線で示した暖房回路と、実線で示した冷房回路とを形成する。

【００１１】また、圧縮機５１が吐出した冷媒の圧力を検出する圧力センサ１と、暖房運転時に室内熱交換器５６から流出する冷媒の温度を検出する温度センサ２と、制御器３とを設置する。なお、５９は室外送風機、６０は室内送風機であり、この室内送風機６０と前記した冷媒制御弁５５・室内熱交換器５６とは、空調を行う室内に設置するので、合わせて室内機と呼んでいる。

【００１２】制御器３としては、例えば図５に示したように、圧力センサ１・温度センサ２が出力する情報を信号変換して中央演算処理装置（以下ＣＰＵと云う）３Ｂへ出力する入力インターフェイス３Ａと、所定の演算式、演算プログラムなどを記憶している記憶装置（以下ＲＯＭと云う）３Ｃと、ＣＰＵ３Ｂからの信号を入力して冷媒制御弁５５などへ所要の信号を出力する出力インターフェイス３Ｄと、所定時間毎に信号を出力し、所要時間が計時できるタイマ機能を備えた時計回路３Ｅと、圧力センサ１・温度センサ２から入力した情報、時計回路３Ｅによって計時した時間などを記憶する読込／消去可能な記憶装置（以下ＲＡＭと云う）３Ｆと、を備えたものを使用する。

【００１３】そして、ＲＯＭ３Ｃには、圧力センサ１・温度センサ２から入力する冷媒回路の圧力および温度の情報に基づいて、冷媒制御弁５５の開度を制御するための、例えば図１～図３に示す制御プログラムを記憶させておく。

【００１４】先ず、図１と図２に基づいて、高負荷解消方式を選択する要領を説明する。空調負荷に基づく通常の運転制御をメイン制御で行っていて、圧力センサ１が所定の圧力、例えば２．３ＭＰａ以上を検出し、高負荷解消方式を選択する必要があると判断されたときには、図１の制御フローを開始し、ステップＳ１では圧力センサ１が検出する冷媒吐出圧力を高圧P_HとしてＲＡＭ３Ｆに記憶する。

【００１５】ステップＳ２では、運転している全室内機の冷媒制御弁５５の開度を、現在の開度の１／２に絞る。

【００１６】ステップＳ３では、時計回路３Ｅのタイマ機能を起動して計時を開始し、ステップＳ４では、ステップＳ３で起動したタイマ機能による計時時間Ｔ１が所定時間、例えば１分を越えているか否かを判定し、越えていればステップＳ６に移行し、そうでなければステップＳ５に移行する。

【００１７】ステップＳ５では、ＲＡＭ３Ｆに記憶している高圧P_Hと、圧力センサ１が現在検出している冷媒の圧力Ｐとを比較し、その圧力差が０．１ＭＰａを越えているときにはステップＳ６に移行し、そうでないときにはステップＳ４に戻る。

【００１８】ステップＳ６では、高圧P_Hと圧力Ｐとを比較し、現在の圧力ＰがＲＡＭ３Ｆに記憶している高圧P_Hより低いときにはステップＳ７に移行して冷媒制御弁５５の開度を閉じる方式の制御を選択し、現在の圧力Ｐの方がＲＡＭ３Ｆに記憶している高圧P_Hより高いときにはステップＳ８に移行して冷媒制御弁５５の開度を開く方式の制御を選択する。

【００１９】そして、ステップＳ９では、運転している全室内機の冷媒制御弁５５の開度を現在の開度の２倍にして元に戻し、メイン制御に復帰する。

【００２０】また、空調負荷に基づく通常の運転制御をメイン制御で行っていて、圧力センサ１が所定の圧力、例えば２．３ＭＰａ以上を検出したとき、図２の制御フローを開始し、ステップＳ２１では運転している室内機を調べ、圧縮機５１吐出側の高圧解消に冷媒制御弁５５の開度を開く方向に制御する方が有効か、閉じる方向に制御する方が有効かを前回判定したときと全く同じ室内機が運転されているときにはステップＳ２２に移行して前回と同じ弁制御方式を選択してメイン制御に戻り、そうでないときにはステップＳ２３に移行し、冷媒制御弁５５を制御する方式の選択を新規に行うことを決定してメイン制御に戻る（ステップＳ２３を経由してメイン制御に戻った場合は、続いて前記した図１の制御が行われる）。

【００２１】次に、図３に基づいて、高圧解消のために実行する冷媒制御弁５５の具体的な制御例を説明する。空調負荷に基づく通常の運転制御をメイン制御で行っていて、圧力センサ１が所定の圧力、例えば２．３ＭＰａ以上を検出し、高圧解消が必要になった場合、図３の制御フローが自動的に開始され、ステップＳ４１では高負荷解消の方法を選択する。この場合、例えば図２・図１の順に実行する。

【００２２】ステップＳ４１において、冷媒制御弁５５の開度を開く方式が選択されたときには、ステップＳ４２に移行して運転している全室内機の冷媒制御弁５５の開度を全開にし、その後メイン制御に戻る。一方、ステップＳ４１において冷媒制御弁５５の開度を閉じる方式が選択されたときには、ステップＳ４３に移行して圧力センサ１が検出する冷媒の圧力をＲＡＭ３Ｆに記憶する。

【００２３】ステップＳ４４では、ＲＡＭ３Ｆに記憶している圧力とＲＯＭ３Ｃに記憶している演算式により、圧縮機５１が吐出している冷媒の飽和温度を演算する。

【００２４】ステップＳ４５では、運転している全室内機の温度センサ２が検出する冷媒の温度を全てＲＡＭ３Ｆに記憶する。

【００２５】ステップＳ４６では、各室内機の過冷却度（ＳＣｉ）をＳＣｉ＝飽和温度－各室内機の冷媒出口温度（温度センサ２が検出する温度）、として演算し、ＲＡＭ３Ｆに記憶する。

【００２６】ステップＳ４７では、各室内機の過冷却度（ＳＣｉ）をＳＣｉ＝ＳＣｉ＋１としてＲＡＭ３Ｆに記憶する。

【００２７】ステップＳ４８では、時計回路３Ｅのタイマ機能を起動して計時を開始し、ステップＳ４９では、ステップＳ４８で起動したタイマ機能による計時時間Ｔ２が所定時間、例えば１０秒を越えているか否かを判定し、越えるのを待ってステップＳ５０に移行する。

【００２８】ステップＳ５０では、ステップＳ４３～ステップＳ４６と同様にして、各室内機の過冷却度（ＳＣ

ｉ′）をＳＣｉ′＝飽和温度－各室内機の冷媒出口温度、として演算し、ＲＡＭ３Ｆに記憶する。

【００２９】ステップＳ５１では、ステップＳ４７で求めた過冷却度（ＳＣｉ）とステップＳ５０で求めた過冷却度（ＳＣｉ′）とを、運転している全室内機に渡って順次比較し、ＳＣｉ－ＳＣｉ′が０を越えているときにはステップＳ５２に移行し、その冷媒制御弁５５の開度を現在より１減らしてステップＳ５０に戻り、ＳＣｉ－ＳＣｉ′が０未満のときにはステップＳ５３に移行し、その冷媒制御弁５５の開度を現在より１増やしてステップＳ５０に戻り、ＳＣｉ－ＳＣｉ′が０（全ての室内機に渡って）のときにはメイン制御に戻る。

【００３０】上記したように、本発明の空気調和機においては、圧力センサ１が所定の高い圧力を検出したとき、運転している室内機の冷媒制御弁５５の開度を絞ってその圧力変化を調べることにより、高圧（高負荷状態）の解消に冷媒制御弁５５を開けた方が有効なのか、閉じた方が有効なのかを判定し、この判定に基づいて室内機の冷媒制御弁５５の開度を制御するので、運転している室内機に冷媒を溜め込み、循環する冷媒の量を減らしても加熱（凝縮）能力が低下しない十分大きな容量を持った室内機が運転しているときには、冷媒制御弁５５の開度を絞って高負荷状態の解消を図り、

【００３１】逆に、運転している室内機の容量が小さく、冷媒制御弁５５の開度を絞って冷媒を室内機に溜め込んだのでは加熱（凝縮）能力が低下し、且つ、圧力がさらに上昇するときには、冷媒制御弁５５の開度を開けて高負荷状態の解消を図るなど、運転している室内機の組み合わせ毎に最適な高負荷解消方法が選択できる。

【００３２】なお、本発明は上記実施の形態に限定されるものではないので、特許請求の範囲に記載の趣旨に沿って各種の変形実施が可能である。

【００３３】例えば、図１におけるステップＳ２の動作は、容量の大きい室内機の中から選択して、例えば１／３の台数、あるいは半分の台数など適宜の台数についてのみ行うように構成することもできる。

【００３４】また、図１におけるステップＳ２の動作は、冷媒制御弁５５の開度を、例えば２０％増加するように構成し、その後の圧力変化を調べるようにしても良い。この場合、ステップＳ６における判定式の不等号は、逆向きにして判定する。

【００３５】

【発明の効果】上記したように、本発明の空気調和機においては、圧力検出手段が所定の高圧を検出したとき、運転している室内機の冷媒制御弁を、例えば１／２の開度に絞るなどしてその圧力変化を調べることにより、高負荷状態の解消に冷媒制御弁を開けた方が有効なのか、

閉じた方が有効なのかを判定し、この判定に基づいて室内機の冷媒制御弁の開度を制御するので、運転している室内機に冷媒を溜め込み、循環する冷媒の量を減らしても加熱（凝縮）能力が低下しない十分大きな容量を持った室内機が運転しているときには、冷媒制御弁の開度を絞って高負荷状態の解消を図り、

【００３６】逆に、運転している室内機の容量が小さく、冷媒制御弁の開度を絞って冷媒を室内機に溜め込んだのでは加熱（凝縮）能力が低下し、且つ、冷媒圧力がさらに上昇するときには、冷媒制御弁の開度を開けて高負荷状態の解消を図るなど、運転している室内機の組み合わせ毎に最適な高負荷解消方法が選択できる。

【００３７】また、高負荷状態の解消に、冷媒制御弁の開度を開く方向に制御する方が有効か、閉じる方向に制御する方が有効かを前回判定したときと全く同じ室内機が運転されているとき、前回と同じ弁制御方式を選択するように構成した空気調和機においては、高負荷状態の解消が速やかに行える。

【図面の簡単な説明】

【図１】高負荷解消方式の選択要領を示す説明図である。

【図２】高負荷解消方式の選択要領を示す説明図である。

【図３】高負荷解消要領を示す説明図である。

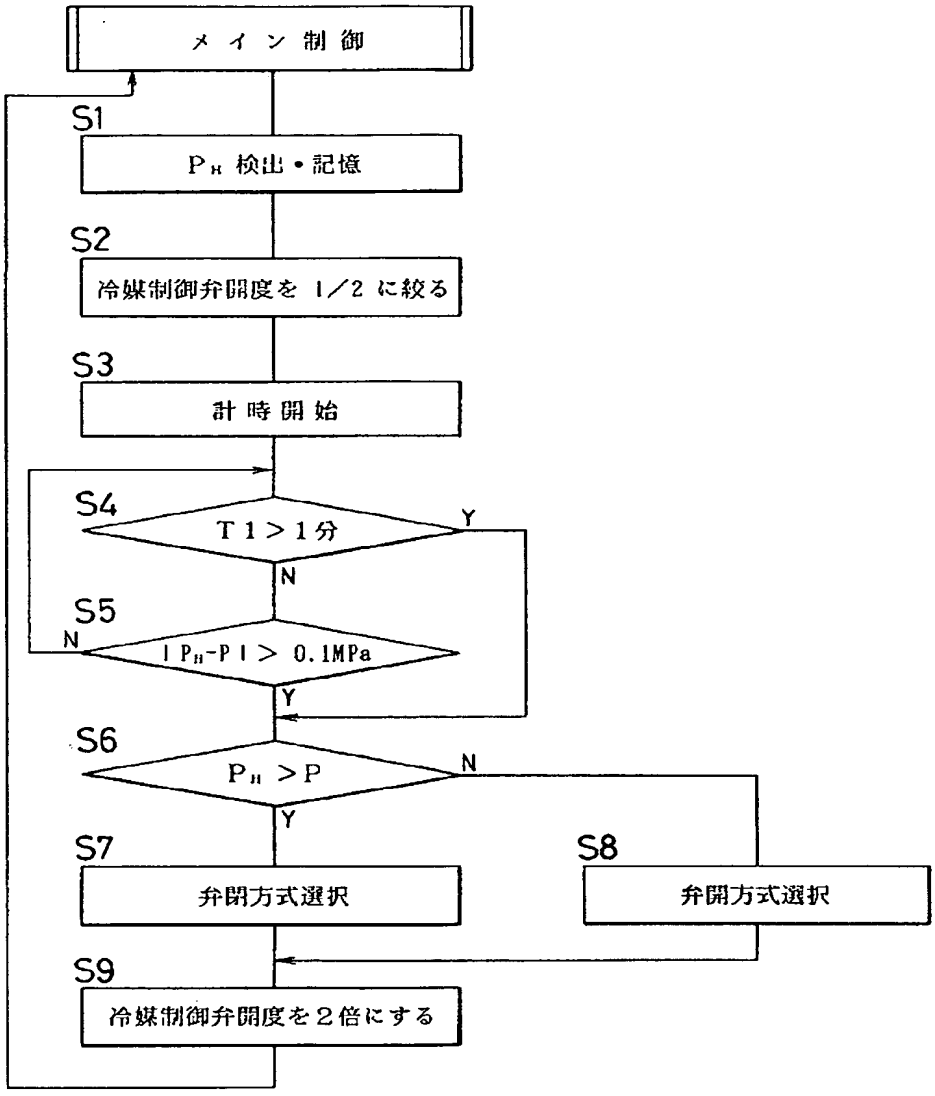
【図４】装置の全体構成を示す説明図である。

【図５】制御器の構成を示す説明図である。

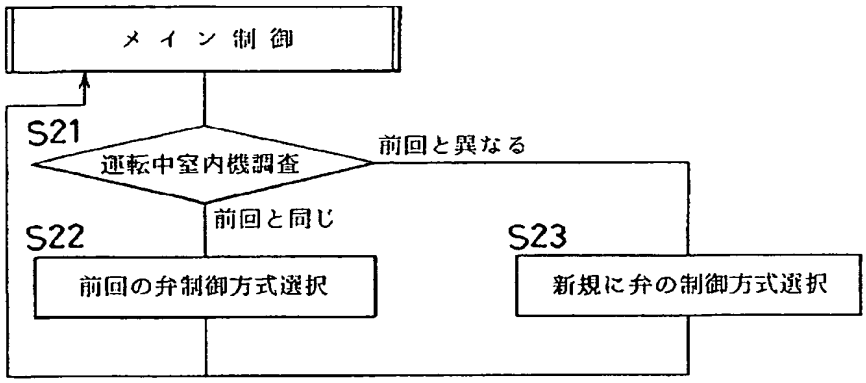
【符号の説明】

１　圧力センサ
２　温度センサ
３　制御器
３Ａ　入力インターフェイス
３Ｂ　中央演算処理装置（ＣＰＵ）
３Ｃ　記憶装置（ＲＯＭ）
３Ｄ　出力インターフェイス
３Ｅ　時計回路
３Ｆ　記憶装置（ＲＡＭ）
５１　圧縮機
５２　四方弁
５３　室外熱交換器
５４　レシーバタンク
５５　冷媒制御弁
５６　室内熱交換器
５７　アキュームレータ
５８　膨張弁
５９　室外送風機
６０　室内送風機

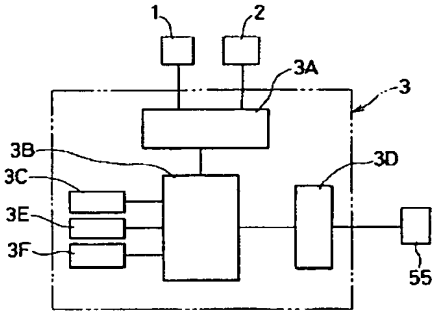
【図１】


メイン制御
S1
P_H 検出・記憶
S2
冷媒制御弁開度を 1／2 に絞る
S3
計時開始
S4
T 1 > 1分
Y
N
S5
N
$|P_H - P| > 0.1MPa$
Y
S6
$P_H > P$
N
Y
S7
弁開方式選択
S8
弁開方式選択
S9
冷媒制御弁開度を２倍にする

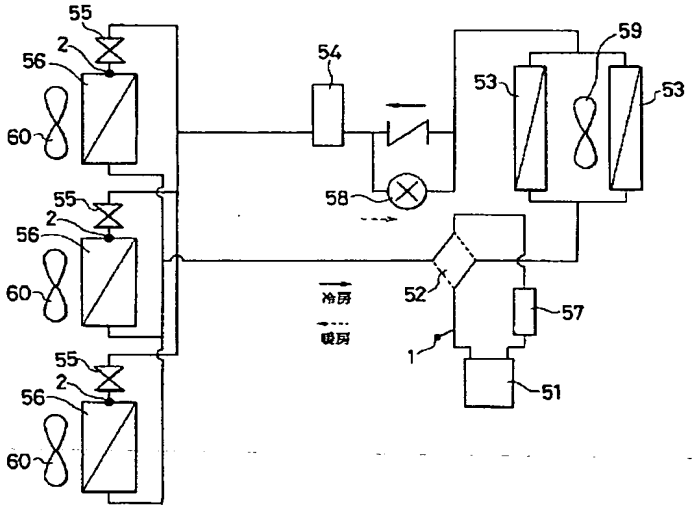
【図２】


メイン制御
S21
運転中室内機調査
前回と異なる
前回と同じ
S22
前回の弁制御方式選択
S23
新規に弁の制御方式選択

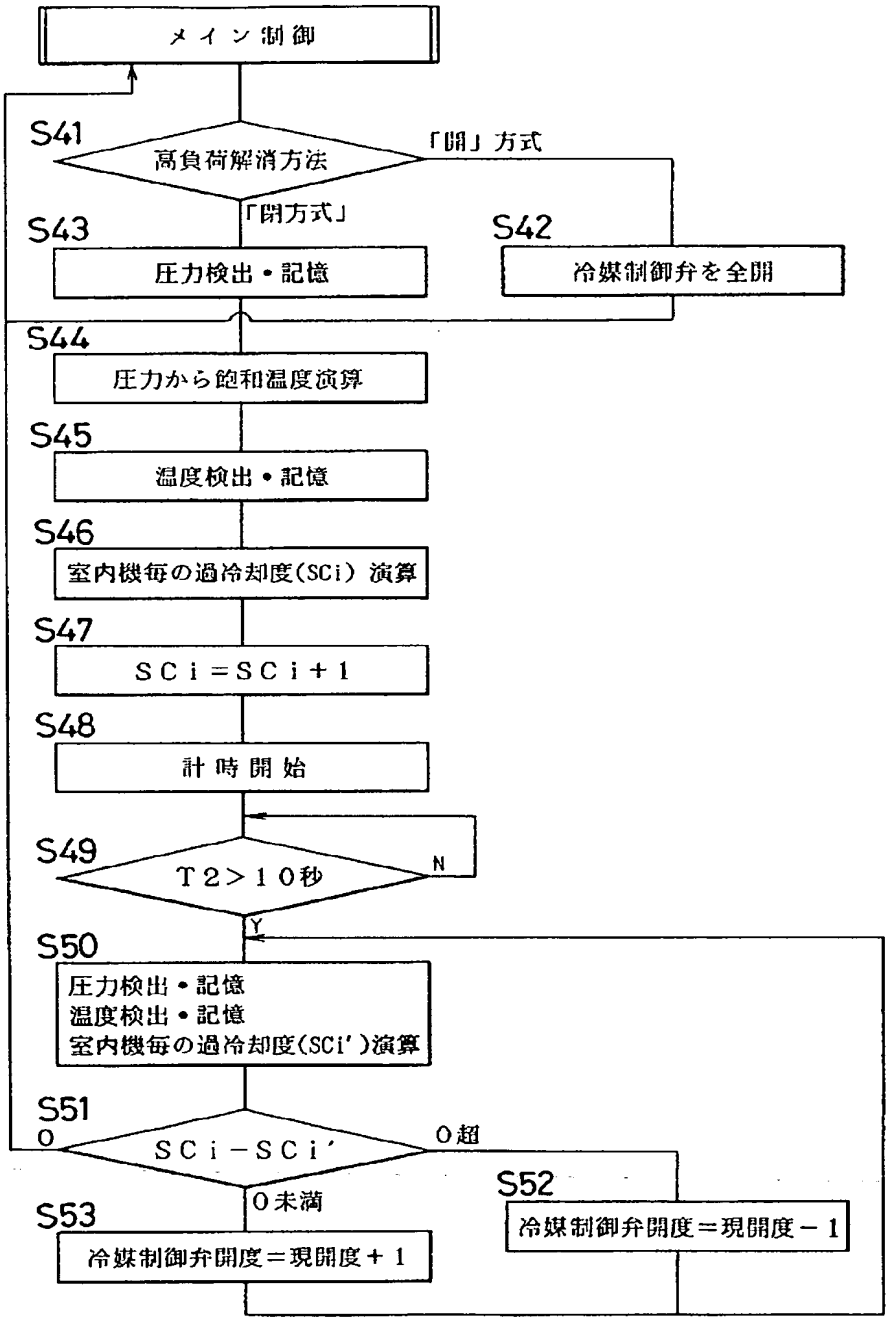
【図５】


1
2
3A
3
3B
3C
3E
3F
3D
55

【図４】


55
2
56
60
54
59
53
58
52
57
1
51
冷房
暖房

【図３】


メイン制御
S41
高負荷解消方法
「開」方式
「閉方式」
S43
圧力検出・記憶
S42
冷媒制御弁を全開
S44
圧力から飽和温度演算
S45
温度検出・記憶
S46
室内機毎の過冷却度(SCi) 演算
S47
ＳＣｉ＝ＳＣｉ＋１
S48
計時開始
S49
Ｔ２＞１０秒
N
Y
S50
圧力検出・記憶
温度検出・記憶
室内機毎の過冷却度(SCi')演算
S51
0
ＳＣｉ－ＳＣｉ'
0超
0未満
S52
冷媒制御弁開度＝現開度－１
S53
冷媒制御弁開度＝現開度＋１